

CLAIMS

What is claimed is:

1. An apparatus for applying strip material to an object, said apparatus comprising:

5 a base having a mandrel for supporting said object, said mandrel projecting from said base, wherein said base rotates via a motor;

a plurality of clamps selectively movable for engaging and maintaining the position of said object, said plurality of clamps affixed to said base; and

10 at least one strip material applicator assembly selectively movable for engaging and applying strip material onto said object as said base rotates.

2. The apparatus of Claim 1, wherein said motor comprises a rotary union coupled with an encoder, said encoder allowing precise control of operational sequence.

15 3. The apparatus of Claim 1, wherein said mandrel comprises a tapered circumference.

20 4. The apparatus of Claim 3, wherein said circumference is tapered from a fixed end toward a free end.

5. The apparatus of Claim 3, wherein said °circumference is tapered in a stepped configuration from a fixed end toward a free end.

6. The apparatus of Claim 1, wherein said mandrel comprises a plurality of openings in a free end thereof to prevent vacuum suction on said object.

7. The apparatus of Claim 1, wherein said mandrel is defined by a length and diameter substantially complimentary to said object.

8. The apparatus of Claim 1, wherein each one of said plurality of clamps comprises a leg and a foot affixed thereto, said clamp selectively movable by an air cylinder.

9. The apparatus of Claim 1, wherein said plurality of clamps are configured 90° apart about a circumference of said object.

10. The apparatus of Claim 1, wherein said at least one strip material applicator assembly comprises:

a panel upon which a pair of spools, at least one roller guide, a pair of vacuum blocks, an arm and guide wheels are affixed, said panel urged forward and backward along a track via a limited pressure air cylinder;

said pair of spools for releasing said strip material;  
said at least one roller guide for aligning said strip material onto said object;  
said pair of vacuum blocks cooperatively operating to begin and end  
application of said strip material;

5           said arm having a scalpel affixed at a free end thereof, said arm severing  
said strip material;

          said guide wheels engaging said object for maintaining proper spatial  
relationship between said assembly and said object.

10       11.   The apparatus of Claim 10, wherein said panel comprises a slot having felt  
wicks saturated with cleaning solvent placed therein, said slot receiving said arm  
and cleansing said scalpel to remove accumulated debris for subsequent use.

          12.   The apparatus of Claim 10, wherein said pair of spools comprises:  
15           a strip material spool having a roll of strip material for dispensing;  
          a backing material spool collecting backing material separated from said strip  
material during application onto said object.

          13.   The apparatus of Claim 12, wherein said strip material spool comprises a  
20           photo-detector that automatically terminates application of said strip material upon  
failure to detect said strip material on said strip material spool.

14. The apparatus of Claim 12, wherein said backing material spool is driven by an air motor positioned behind said backing material spool, said air motor allowing for adjustment to pulling tension and speed of collecting said backing material.

5 15. The apparatus of Claim 12, wherein each of said pair of spools comprise a laterally adjustable flange to accommodate said strip material of varying widths.

16. The apparatus of Claim 10, wherein said pair of vacuum blocks comprise;  
an upper vacuum block;  
10 a lower vacuum block, wherein a margin separates said upper vacuum block from said lower vacuum block;  
each of said pair of vacuum blocks having a plurality of apertures in communication with a vacuum generating air cylinder to accurately position said strip material onto said object.

15 17. The apparatus of Claim 16 further comprising a pivotal retention brace affixed to said lower vacuum block for placing tension on said strip material as said scalpel severs said strip material.

20 18. The apparatus of Claim 10, wherein said arm rotates by expansion and contraction of an air cylinder communicating with said arm.

19. The apparatus of Claim 1 further comprising a plurality of strip material applicator assemblies.

5 20. The apparatus of Claim 19, wherein said plurality of strip material applicator assemblies comprise a pair of strip material applicator assemblies positioned to one side of a central axis of said base.

10 21. The apparatus of Claim 19, wherein said plurality of strip material applicator assemblies comprise a pair of strip material applicator assemblies positioned to one side of a central axis of said base, and further comprises a second pair of strip material applicator assemblies positioned to an opposite side of said central axis of said base.

15 22. The apparatus of Claim 1 further comprising a direct plasma flame treatment member selectively movable adjacent said object, said flame member generating a flame for evaporating residue from an exterior of said object.

20 23. The apparatus of Claim 1, further comprising a selectively movable brush head for engaging said strip material applied to said object, said brush head removing air pockets and surface debris therefrom.

24. The apparatus of Claim 1, wherein said object is a member selected from the group consisting of a circular exterior circumferential surface and a polygonal exterior perimeter surface.

5 25. The apparatus of Claim 1, wherein said strip material is a member selected from the group consisting of reflective tape, packaging tape, deformable metal material, deformable plastic material and deformable rubber material.

10 26. The apparatus of Claim 1 further comprising a pair of visual detectors at a front of said apparatus, wherein unauthorized penetration of an item breaks a beam between said detectors and automatically terminates application cycle.

27. An apparatus for applying reflective tape to a drum, said apparatus comprising:

15 a base having a mandrel for supporting said drum, said mandrel projecting from said base, wherein said base rotates via a motor;

a plurality of clamps selectively movable for engaging and maintaining the position of said drum, said plurality of clamps affixed to said base; and

20 a plurality of strip material applicator assemblies selectively movable for engaging and applying strip material onto said drum as said base rotates.

28. The apparatus of Claim 27, wherein said motor comprises a rotary union coupled with an encoder, said encoder allowing precise control of operational sequence.

5 29. The apparatus of Claim 27, wherein said mandrel comprises a tapered circumference.

30. The apparatus of Claim 29, wherein said circumference is tapered from a fixed end toward a free end.

10 31. The apparatus of Claim 29, wherein said circumference is tapered in a stepped configuration from a fixed end toward a free end.

15 32. The apparatus of Claim 27, wherein said mandrel comprises a plurality of openings in a free end thereof to prevent vacuum suction on said drum.

33. The apparatus of Claim 27, wherein said mandrel is defined by a length and diameter substantially complimentary to said drum.

20 34. The apparatus of Claim 27, wherein each one of said plurality of clamps comprises a leg and a foot affixed thereto, said clamp selectively movable by an air

cylinder.

35. The apparatus of Claim 27, wherein said plurality of clamps are configured 90° apart about a circumference of said drum.

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36. The apparatus of Claim 27, wherein said at least one strip material applicator assembly comprises:

a panel upon which a pair of spools, at least one roller guide, a pair of vacuum blocks, an arm and guide wheels are affixed, said panel urged forward and backward along a track via a limited pressure air cylinder;

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said pair of spools for releasing said strip material;

said at least one roller guide for aligning said strip material onto said drum;

said pair of vacuum blocks cooperatively operating to begin and end application of said strip material;

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said arm having a scalpel affixed at a free end thereof, said arm severing said strip material;

said guide wheels engaging said object for maintaining proper spatial relationship between said assembly and said drum.

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37. The apparatus of Claim 36, wherein said panel comprises a slot having felt wicks saturated with cleaning solvent placed therein, said slot receiving said arm and cleansing said scalpel to remove accumulated debris for subsequent use.

5 38. The apparatus of Claim 36, wherein said pair of spools comprises:  
a strip material spool having a roll of strip material for dispensing;  
a backing material spool collecting backing material separated from said strip material during application onto said drum.

10 39. The apparatus of Claim 38, wherein said strip material spool comprises a photo-detector that automatically terminates application of said strip material upon failure to detect said strip material on said strip material spool.

15 40. The apparatus of Claim 38, wherein said backing material spool is driven by an air motor positioned behind said backing material spool, said air motor allowing for adjustment to pulling tension and speed of collecting said backing material.

41. The apparatus of Claim 38, wherein each of said pair of spools comprise a laterally adjustable flange to accommodate said strip material of varying widths.

42. The apparatus of Claim 36, wherein said pair of vacuum blocks comprise;  
an upper vacuum block;  
a lower vacuum block, wherein a margin separates said upper vacuum block  
from said lower vacuum block;  
5 each of said pair of vacuum blocks having a plurality of apertures in communication  
with a vacuum generating air cylinder to accurately position said strip material onto  
said drum.

43. The apparatus of Claim 42 further comprising a pivotal retention brace  
10 affixed to said lower vacuum block for placing tension on said strip material as said  
scalpel severs said strip material.

44. The apparatus of Claim 36, wherein said arm rotates by expansion and  
contraction of an air cylinder communicating with said arm.

15 45. The apparatus of Claim 27 further comprising a plurality of strip material  
applicator assemblies.

46. The apparatus of Claim 45, wherein said plurality of strip material applicator  
20 assemblies comprise a pair of strip material applicator assemblies positioned to one  
side of a central axis of said base.

47. The apparatus of Claim 45, wherein said plurality of strip material applicator assemblies comprise a pair of strip material applicator assemblies positioned to one side of a central axis of said base, and further comprises a second pair of strip material applicator assemblies positioned to an opposite side of said central axis of said base.

48. The apparatus of Claim 27 further comprising a direct plasma flame treatment member selectively movable adjacent said drum, said flame member generating a flame for evaporating residue from an exterior of said drum.

49. The apparatus of Claim 27, further comprising a selectively movable brush head for engaging said strip material applied to said drum, said brush head removing air pockets and surface debris therefrom.

50. The apparatus of Claim 27, wherein said drum comprises a uniform circumference.

51. The apparatus of Claim 27, wherein said drum comprises a tapered circumference.

52. The apparatus of Claim 51, wherein said drum circumference is tapered from an opened end to an enclosed end.

53. The apparatus of Claim 51, wherein said drum circumference is tapered in a stepped configuration from an opened end to an enclosed end.

54. The apparatus of Claim 27, wherein said strip material is a member selected from the group consisting of reflective tape, packaging tape, deformable metal material, deformable plastic material and deformable rubber material.

55. The apparatus of Claim 27 further comprising a pair of visual detectors at a front of said apparatus, wherein unauthorized penetration of an item breaks a beam between said detectors and automatically terminates application cycle.

56. A method of applying strip material to an object comprising the steps of:  
beginning an initial sequence, said initial comprising seating of an object onto a mandrel, actuating engagement of the plurality of clamps onto said object and actuating rotation of said mandrel;

progressing to an intermediate sequence, said intermediate sequence comprising urging of at least one strip material applicator assembly forward to engage and apply strip material to said object and then severing said strip material

after said object completes one revolution about said base;

finishing with a terminal sequence, said terminal sequence comprising terminating rotation of said mandrel and seated said object, releasing engagement of said plurality of clamps from said object, and removing said object from said mandrel.

57. The method of Claim 56, wherein said initial sequence further comprises the steps of moving a direct flame plasma treatment member adjacent to said object, flame treating an exterior surface of said object to evaporate liquid residue, and moving said direct flame plasma treatment member away from said object.

58. The method of Claim 56, wherein said intermediate sequence further comprises the steps of moving a brush head to engage said strip material as applied to said object, dispersing of air pockets and aiding adhesion between said strip material and said object by engagement of said brush head with said object, and moving said brush head away from said object.